A Small Miocene Herpetofauna from Texas

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Records of North American Miocene amphibians and reptiles are so few that the discovery of a small herpetofaunal assemblage from the Miocene of the Texas Gulf Coastal Plain is of much interest. The fossils were found by Bob H. Slaughter, Curator of the Shuler Museum of Paleontology of Southern Methodist University, who collected, washed, and sorted the material from the site, and kindly sent the herpetological remains to me for study. These fossils represent at least two salamanders, two frogs, a crocodilian, a lizard, and two snakes. All of the six genera identified have living representatives, but the two forms discussed at the specific level are extinct.

A recent flood has buried the site under a considerable amount of silt, but Mr. Slaughter will continue to study the locality, and plans a future publication that will detail the site and its mammalian remains. The following information has been supplied by Mr. Slaughter. The site lies within the Flemming formation and is stratigraphically slightly below the Coldspring local fauna which has been provisionally referred to the late middle Miocene by Quinn (1955). The deposit is on the property of Mr. F. S. McGee and is near the base of a feature called Pine Isle which was formed by the truncation of a regional high by the Trinity River. The site lies at longitude 95° 03′, latitude 30° 41′, and is seven miles northeast of the town of Coldspring on the western bank of the Trinity River in San Jacinto County, Texas.

I wish to take this opportunity to thank Mr. Slaughter for allowing me to study these fossils that he collected while working under the support of National Park Service (Southwestern Region) Contract Number 14-10-0333-1712. My work was supported in part by National Science Foundation Grant GB-5988. Donna Rae Holman made the drawings.

Class AMPHIBIA
Order Urodela
Family **Sirenidae**
Siren sp. indet.

Material. Thoracic vertebra, SMP-SMU 61869, Fig. 1a.

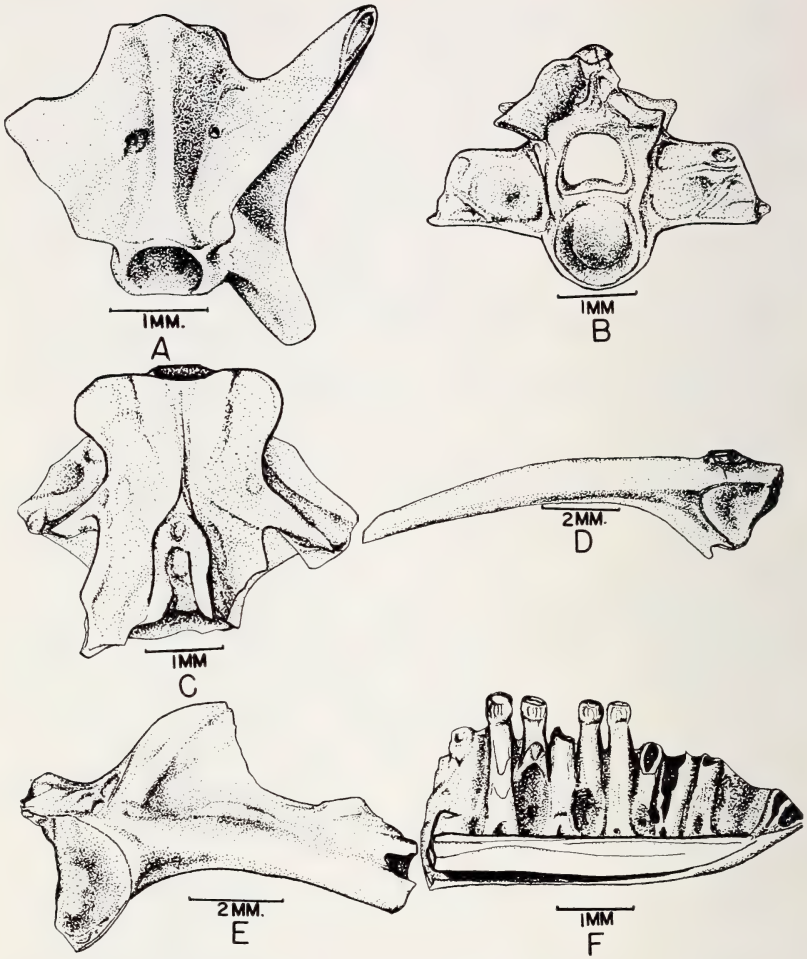

Fig. 1a. SMP-SMU 6189, vertebra of *Siren* sp. indet., ventral view; b and c, SMP-SMU 61870, holotype vertebra of *Notophthalmus slaughteri* n. sp. (b, posterior view, c, dorsal view); d, SMP-SMU 61871, holotype left ilium of *Hyla miocenica* n. sp., lateral view; e, SMP-SMU 61872, right ilium of *Rana* cf. *R. pipiens*, lateral view; f, SMP-SMU 61874, left dentary of *Eumeces* sp. indet., lingual view.

Remarks. This fragmentary vertebra represents the family Sirenidae and is assigned to the genus *Siren* rather than to the genus *Pseudobranchus* on the basis that the fossil has the lower margin of its centrum very slightly curved rather than concave (Goin and

Auffenberg, 1955). The Texas fossil is similar in size to Miocene and Pliocene species of *Siren* and is larger than fossil and recent species of *Pseudobranchus*.

Unfortunately, certain important parts of the fossil are missing. Thus, I feel that it is unwise to attempt a specific designation. The possibility exists that the Texas vertebra represents a new form, as the only other pre-Pleistocene *Siren* fossils known are *Siren hesterna* Goin and Auffenberg from the lower Miocene of northcentral Florida, and *Siren simpsoni* Goin and Auffenberg from the middle Pliocene of northcentral Florida. Both the Florida and the Texas sirens are small forms. The centrum length of the Texas *Siren* is 2.50 mm. This length is 2.67 mm in the lower Miocene form, *S. hesterna*, and it is about 3.0 mm in the middle Pliocene *S. simpsoni* (estimated from Fig. 1 in Goin and Auffenberg). The Texas fossil probably represents an adult as it has an interrupted notochordal canal.

Following is a description of the fossil. The neural arch, the aliform processes, and the neural spine are missing. The left prezygapophysis is missing. The right prezygapophysis is ovaloid in shape and its prezygapophyseal face is flat and has its margin slightly elevated. The centrum is amphicoelous, constricted at its middle, and has it notochordal canal interrupted by a bony partition. The left transverse processes are broken. The right transverse processes are posteriorly directed. The lower margin of the centrum is only slightly curved when viewed from the side, and the bottom of the centrum has a well-developed keel. There is a large fossa on each side of the keel at about its middle. The right fossa is smaller and slightly posterior to the left one. Marked depressions occur on each side of the keel.

Family **Salmandridae**

Notophthalmus slaughteri n. sp.

Holotype. Dorsal vertebra, SMP-SMU 61870, Fig. 1b and 1c.

Diagnosis. A *Notophthalmus* that resembles *Notophthalmus robustus* Estes of the lower Miocene of northcentral Florida in its low neural spine, but differs from *N. robustus* and is similar to modern species of *Notophthalmus* in having its rib bearers longer and less stubby.

Etymology. The species is named in honor of its collector, Bob

H. Slaughter, Curator of the Shuler Museum of Paleontology of Southern Methodist University.

Description. The vertebra is relatively complete, but it has part of its right postzygapophysis and the anterior part of its neural spine missing. The nural spine is relatively low and its top portion is a thickened cap of pitted dermal bone. The prezygapophyses have round faces. The neural arch is relatively low and the neural canal is slightly depressed. In anterior view, the prezygapophyses have their edges turned upward slightly and the rib-bearers are relatively long and narrow. The cotyle is round and the notochordal canal is interrupted. In posterior view, the dorsal part of the neural arch is quite robust, but the ventral portion is thinner. The bottom of the centrum is only slightly constricted at its middle and is quite distinct from the transverse processes which have their bases highly sculptured.

Remarks. Estes (1963) has pointed out that of the living genera of the Salamandridae, only *Notophthalmus* and *Cynops* have the same peculiar pattern of the dermal cap of the neural spine, and furthermore that *Cynops* lacks the extensive pitting on the dermal cap that is found in *Notophthalmus.* The fossil vertebra agrees with the latter genus in this character. It seems quite possible that *N. slaughteri* is the temporal equivalent of *N. robustus,* as the major difference between the two is the more robust rib-bearers of the latter species. *Notophthalmus slaughteri* resembles *N. robustus* and differs from the recent species in having a lower neural spine, although some vertebrae of a recent *N. viridescens* (Rafinesque) from Brown County, Indiana have neural spines that are almost as low as in *N. slaughteri.*

In summary, it should be emphasized that the vertebrae of all known *Notophthalmus* from Early Miocene to the present are very similar in detailed structure and differ mainly in relative proportions.

Order Anura
Family **Hylidae**
Hyla miocenica n. sp.

Holotype. Left ilium, SMP-SMU 61871, Fig. 1d.

Diagnosis. A moderately large *Hyla* that shows similarities to *Hyla arenicolor* Cope, *Hyla squirella* Sonnini and Latreille, and

Hyla versicolor Le Conte, but differs in that its dorsal protuberance is more oval in outline than in the former two species, and is less flattened and more produced from the shaft than in the latter species.

Description. The terminology of this section follows Chantell (1964). The ilium is complete except that part of the dorsal surface of the dorsal protuberance is broken, and the tips of the dorsal and ventral acetabular expansions are partially broken. The dorsal prominence is only moderately developed. The dorsal protuberance is oval in outline, is well produced laterally, and is longer than it is high. The surface of the dorsal protuberance is rounded, and the protuberance is moderately distant from the acetabular border. The acetabulum is well excavated and has a distinct border. The ventral acetabular expansion is extensive and its anterior border makes a wide angle with the shaft. The shaft is slightly curved and lacks either a crest or a ridge.

Discussion. The Texas fossil *Hyla* resembles some of the recent species of *Hyla* more than it does hylids that have been described from the lower Miocene of Florida and from the "Mio-Pliocene" of Nebraska. *Hyla miocenica* differs from *Hyla goini* Auffenberg from the lower Miocene of northcentral Florida in that its dorsal protuberance is longer and is farther from the acetabular border. *Hyla miocenica* differs from *Pseudacris nordensis* Chantell in having a much more extensive ventral acetabular expansion and in having its dorsal protuberance closer to the acetabular border. Upon comparison with species of North America Hylidae the fossil appears most similar to *Hyla arenicolor, H. squirella,* and *H. versicolor* all of which have individuals that are rather close in structure to *H. miocenica.* Nevertheless, *H. miocenica* may be separated from individuals of these species available to me on characters given in the diagnosis section. Unfortunately, it is impossible to say to which of the recent species the fossil species is most closely allied.

Family **Ranidae**

Rana cf. *Rana pipiens* Schreber

Material. One left and one right ilium belonging to separate individuals, one sacral vertebra, SMP-SMU 61872, Fig. 1e.

Remarks. These ilia are not distinguishable from those of recent

Rana pipiens (Holman, 1965) and are tentatively assigned to this species. The ilia represent two small individuals.

Based on the report of Tihen (1954) the Texas fossil sacrum is also similar to that of recent *Rana pipiens*. The length of the centrum of the fossil is 2.0 mm, the width is 2.0 mm, thus the ratio of the length of the centrum divided by the width of the centrum is 1.0. This indicates the fossil falls into Tihen's (*op cit.* p. 219, Fig. 1) *Rana pipiens* group. The intercondylar space of the fossil measures 0.6 mm. The ratio of the width of the centrum divided by the intercondylar space is 3.33. This ratio also indicates the fossil is similar to Tihen's (*op. cit.* p. 220, Fig. 2) *R. pipiens* group. I can find no subjective characters to distinguish the fossil sacrum from those of recent *Rana pipiens* at hand.

This is only the second Miocene locality in the New World that has yielded the genus *Rana*. Two extinct species of *Rana* and *Rana* cf. *R. pipiens* have been identified from the early Miocene beds of northcentral Florida (Holman *op. cit.*). One of the extinct forms, *Rana bucella*, shows no close affinities to recent or fossil *Rana* species, but the other form, *R. miocenica*, is similar to recent *R. pipiens*.

Class REPTILIA
Order Crocodilia
Family **Alligatoridae**
cf. *Alligator* sp. indet.

Material. Two small teeth, SMP-SMU 61873.

Remarks. These teeth have a thick enamel layer with a finely striated surface and have a sharp anterior and posterior keel as seen in recent *Alligator mississipiensis* (Daudin) teeth.

Order Squamata
Family **Scincidae**
Eumeces sp. indet.

Material. Left dentary, SMP-SMU 61874, Fig. 1f.

Remarks. This partial dentary is referable to the genus *Eumeces*, but it is not assigned to species because of its fragmentary nature, and because several species of recent *Eumeces* are not available as skeletons. The bone represents about the anterior one-half of the lower jaw of a skink a little larger than a recent *Eumeces obsoletus* (Baird and Girard) with a skull length of 19.7 mm as

measured from the tip of the rostrum through the occipital condyle.

A description of the fossil dentary follows. The Meckelian groove is open and the ramus above this groove is robust. Nine teeth and remnants of teeth are present. The teeth are columnar and regularly spaced. The crowns are swollen and quite distinct from their bases. The tooth crowns are striated and show patterns of wear only on the lingual side. These patterns of wear on the crowns take the form of grooves. None of the recent skeletons I have examined show as much wear on the tooth crowns. Each of the two posterior complete teeth is about one-fourth produced above the dorsal rim of the dentary, whereas each of the two anterior complete teeth is about one-third produced above the dorsal rim of the dentary. In labial view, the bases of the teeth are quite constricted and have their surfaces very smooth. There are four foramina on the labial side of the dentary. The most anterior foramen is at the tip of the bone and is ventral, the most posterior one is dorsal, and the middle two are intermediate in position. *Eumeces* sp. from the early Miocene of northcentral Florida (Estes, 1963) is the earliest record of the genus. There are no other Miocene records.

Family **Columbridae**
Colubridae sp. indet.

Material. Fragmentary vertebra, SMP-SMU 61875.

Remarks. This vertebra is too fragmentary for sufamilial identification, but on the basis of its being longer than wide, its moderately high neural spine, and the thin base of its broken hypapophysis it is referred to the family Colubridae.

Family **Viperidae**
Viperidae sp. indet.

Material. Vertebra, SMP-SMU 61876.

Remarks. This vertebra represents the first Miocene record of a viperid snake from North America. Previously, the earliest records are those of Brattstrom (1954) who reported *Agkistrodon contortrix* (Linnaeus) and *Crotalus viridis* (Rafinesque) from the early Pliocene of Nebraska.

A description of the vertebra is as follows. In dorsal view, the vertebra is wider than long. The neural spine is broken off. The right prezygapophysis is broken and the left prezygapophyseal

shape. The accessory process of the left prezygapophysis is broken. In anterior view, the neural arch is robust, the cotyle is round and is larger than the neural canal, and the depressions on either side of the cotyle are moderately deep. A rather large fossa is present in the left of these depressions. The transverse processes are almost entirely broken. In ventral view, the centrum is triangular in shape and is wider anteriorly than it is posteriorly. The hypapophysis is broken at its base, but it is thick as in modern viperids. Moderately excavated depressions occur on either side of the bases of the hypapophyses. In posterior view, the neural arch is robust and the condyle is round and about the same size as the neural canal.

Discussion

Perhaps the most striking aspect of the fossil herpetofauna is that its genera are modern. In fact, all six of them can be found in or near the area today. It is also interesting to note (although snake material is scarce) that the Colubridae and the Viperidae are the only snake families represented, for earlier North American Cenozoic deposits have their ophidian faunas almost completely dominated by boid snakes (Holman, 1964).

Based on the habitat preferences of the majority of living species of most of the genera identified in the present study (*Siren, Notophthalmus, Hyla, Rana,* and *Alligator*), a quiet water situation such as a marsh or a swamp was probably an important feature of the area during the time of the accumulation of the fossils. The type of terrestrial situation represented is unknown since the specific affinities of *Eumeces* and the snakes are obscure.

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